

REMARKS

The examiner is thanked for the performance of a thorough search. Claims 1, 7, and 8 are amended. Claims 15-17 are canceled. New claims 18-47 are presented. Hence, Claims 1-14 and 18-47 are pending in the application. The amendments to the claims as indicated herein do not add any new matter to this application. Furthermore, amendments made to the claims as indicated herein have been made to exclusively improve readability and clarity of the claims and not for the purpose of overcoming alleged prior art.

Each issue raised in the Office Action mailed October 19, 2005 is addressed hereinafter.

New claims 18-47 generally correspond in scope to claims 1-14 as follows:

<b>Method Claims</b>	<b>Computer-Readable Medium Claims</b>	<b>Apparatus Claims with “Means”</b>	<b>Apparatus Claims</b>
1-6	18	20-25	26-31
7-14	19	32-39	40-47

**I. ISSUES NOT RELATING TO PRIOR ART**

**A. SPECIFICATION**

The Office Action objected to the disclosure because of an informality on page 4. The informality is addressed herein. Reconsideration is respectfully requested.

**B. SECTION 101 ISSUE**

The Office Action rejected claim 17 as allegedly not limited to tangible embodiments. Applicants disagree. Claim 17 recited an article of manufacture in the form of a computer-readable medium, which is statutory subject matter because 35 U.S.C. 101 does not state that a “manufacture” must be tangible in the sense of graspable, able to be handled, or perceivable by the unaided human senses, and no case decision has imposed such a requirement. Indeed, the Office has issued patents for single-cell life forms, which are imperceptible and unable to be

handled except with the aid of a microscope or a needle. Light waves are tangible, as anyone who has endured sunburn, or performed or undergone laser surgery, can attest.

Although the Office has no basis in the statute for the rejection, and has cited no supporting case law, to expedite positive resolution of the case and save the Applicants the cost of an appeal, claims 18-19 herein recite tangible storage media. Favorable consideration is respectfully requested.

## II. ISSUES RELATING TO PRIOR ART

### A. CLAIMS 1 TO 6—PETERSON ET AL.

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Peterson et al., “Computer Networks,” Chapters 2 and 5 (“Peterson”). The rejection is respectfully traversed.

The Office Action reasons that the sliding windows of Peterson “have the property of ignoring bytes received outside of the sequence number range (the window) because it is assumed that a received segment either has been read or the received segment has a sequence number too high to be stored by the buffer at that time.” (Citations omitted.) “Hence,” the Office Action contends, “Peterson discloses receiving a TCP segment carrying an ACK value ...” and performing the claimed determining and discarding steps.

This is incorrect. In Peterson, ignoring bytes received outside of the sequence number range is a determination based on the **sequence number**, not based on the ACK value as claimed. As defined in RFC 793, TCP segments carry both a sequence number and an ACK value—two separate values, used for entirely different purposes. Purely for clarification and to make express what was previously inherent, present claim 1 recites that the segment has a sequence number and a separate ACK value. Peterson has no disclosure whatsoever about

performing any test on the ACK values of a received segment, or discarding segments when the ACK value satisfies a particular test, as claimed.

For example, Peterson pp. 105-115, introducing a generic sliding window algorithm, describes all variables in terms of sequence numbers; the TCP-specific description of Peterson pp. 383 is based on that foundation. Peterson pp. 112, second full paragraph (“When the incoming frame is an ACK ...”) actually **teaches away** from the claimed approach by stating that ACK frames are processed without any form of testing on the magnitude of the ACK value. Peterson p. 383, last line refers to sequence numbers only. Peterson p. 384 refers to three pointers of a receiver that are necessarily based on received sequence numbers.

The difference between sequence numbers and ACK values is well known among skilled TCP developers, and if Peterson had meant to refer to testing ACK values, Peterson would have used that term. Thus, the rationale of the Office Action is not supported in Peterson.

Perhaps recognizing the deficiency of Peterson, the Office Action provides, at pp. 4-6 (paragraph 9-12), a rationale for equivalency. However, the rationale is incorrect for at least two reasons. First, paragraph 11 is not correct. Determining whether the  $ACK < \min(\text{initial sequence number, lower bound of the window assuming next acknowledged sequence value is the upper bound})$  and discarding such segments is not what is claimed, and is vulnerable to an attack that Applicant’s claims prevent. Assume that  $ISN=1$ ,  $snduna=272$ , window size=200, the last ACK’d byte had a sequence number of 72, and an attacker sends  $ACK=50$ . Under the Office Action’s rationale, 50 is not less than the ISN of 1 (and the ISN is always the lesser value in the Office Action’s “min” statement). Therefore, the Office Action’s approach would accept the packet. In contrast, in Applicant’s approach:

$$50 < 272 - \min(272-1, 200)$$

$50 < 272 - 200$

$50 < 72$

Therefore, Applicant's approach would reject the packet, because the attacker has attempted to present an invalid ACK value.

Many other examples can be given, but the preceding establishes that paragraph 11 of the Office Action does not state relationships that are equivalent to what is claimed. Moreover, Peterson does not suggest or teach the relationships proposed in the Office Action, because Peterson says nothing about testing ACK values in any way, as opposed to sequence numbers. Peterson, as with RFC 793 and the other prior approaches identified in Applicants' Background section, does not test ACK values at all, relying on senders to "honestly" present such values.

At page 6, the Office Action presents an alleged motivation to modify Peterson to provide the subject matter of claim 1 based on Peterson p. 383. However, the motivation is irrelevant. The attacks prevented in the claimed approach do not attempt to disrupt the order of received bytes; instead, they attempt to inject harmful data payloads into the TCP stream, to cause applications to crash or perform errors. Note that in Applicants' FIG. 2, in packets 114, 116 the attacker has guessed a valid sequence number; thus, maintaining ordered data in the face of attacks is not an issue involved in the claimed solution. As a result, no skilled artisan would consider modifying Peterson for the reason given in the Office Action.

Claims 2-6 depend from claim 1 and incorporate all the features of claim 1 by dependency. Because Peterson does not disclose, teach or suggest the subject matter of claim 1, Peterson necessarily does not disclose, teach or suggest the subject matter of claims 2-6. Further, the dependent claims have features that independently render them patentable. For example, claim 5 recites "determining whether the ACK value is equal to an expected ACK value or a range of values less than an initial sequence value window" and discarding a TCP segment when

the quoted determination is true. As discussed above, Peterson has no description about testing ACK values, as opposed to sequence number values. Therefore, Peterson does not teach, disclose or suggest the quoted feature.

For at least the foregoing reasons, Peterson does not teach or suggest the subject matter of claims 1-6. Reconsideration is respectfully requested.

Claims 18, 20-25, and 26-31 correspond in scope to claims 1-6, and are allowable for the reasons given above for claims 1-6. Favorable consideration is respectfully requested.

B. CLAIMS 7-17—PETERSON IN VIEW OF ZUK

Claims 7-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Peterson in view of Zuk et al. 2003-0154399 (Zuk). The rejection is respectfully traversed.

The Office Action relied on Zuk to show the feature of claim 7 of “discarding TCP segments from the re-assembly buffer when the first TCP segment overlaps any data segment previously received in the re-assembly buffer.” Present claim 7 recites “discarding **all TCP segments** that are in the re-assembly buffer **when the first TCP segment overlaps any data segment** previously received in the re-assembly buffer,” as in original claim 8. Zuk’s entire disclosure relating to “overlaps” is: “... the TCP reassembly software module .... Orders the TCP packets that arrived out of order while removing packet overlaps and duplicate packets that were unnecessarily re-transmitted.”

Zuk’s one-sentence description cannot reasonably be interpreted to provide for discarding **all** segments—even non-overlapping ones—when a particular segment overlaps **any** previously received segment, as the Office Action contends regarding former claim 8 (Office Action, page 8, paragraph 19). The rationale stated in the Office Action—that removing segments would have been obvious because identifying overlap indicates an inconsistency—comes only from Applicants’ specification, not from Zuk or any other source. Zuk only describes “removing

packet overlaps,” not non-overlapping packets as well. Further, nothing in Zuk or any other reference suggests interpreting an overlap as indicating injection of spurious segments, and discarding **all** segments in response. That rationale comes solely from Applicants’ specification. Thus, the Office Action is founded on impermissible hindsight. Indeed, the Office Action indicates the use of hindsight by stating that Applicants’ claim “is obvious,” rather than “would have been obvious,” which is the language of the statute.

Claims 8-14 depend from claim 7 and incorporate all the features of claim 7 by dependency. Because Peterson in view of Zuk does not disclose, teach or suggest the subject matter of claim 7, Peterson in view of Zuk necessarily does not disclose, teach or suggest the subject matter of claims 8-14. Further, the dependent claims have features that independently render them patentable. For example, present claim 8 recites, “storing the first TCP segment in the re-assembly buffer when the first TCP segment overlaps any data segment previously received in the re-assembly buffer.” Thus, in the complete subject matter of claim 8, detecting overlap with a newly received segment results in discarding everything in the reassembly buffer, but storing the newly received segment there. Zuk has no teaching of this technique.

For at least the foregoing reasons, Peterson does not teach or suggest the subject matter of claims 7-14. Reconsideration is respectfully requested.

Applicants interpret page 10, paragraph 25 of the Office Action to reject claims 15-17 over Peterson in view of Zuk. Claims 15-17 are canceled herein, so the rejections of claims 15-17 are moot.

Claims 19, 32-39, and 40-47 correspond in scope to claims 7-14, and are allowable for the reasons given above for claims 1-6. Favorable consideration is respectfully requested.

III. CONCLUSIONS & MISCELLANEOUS

For the reasons set forth above, all of the pending claims are now in condition for allowance. The Examiner is respectfully requested to contact the undersigned by telephone relating to any issue that would advance examination of the present application.

A petition for extension of time is hereby made for three (3) months and otherwise to the extent necessary to make this reply timely filed. A check for the petition for extension of time fee is enclosed herewith. If any applicable fee is missing or insufficient, throughout the pendency of this application, the Commissioner is hereby authorized to any applicable fees and to credit any overpayments to our Deposit Account No. 50-1302.

Respectfully submitted,

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